

SEMICONDUCTOR DEVICE AND MANUFACTURING METHOD THEREOF

Application No. NEW - Attorney Docket No. OKI.621

Inventor: Akio NAKAMURA

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Fig. 1

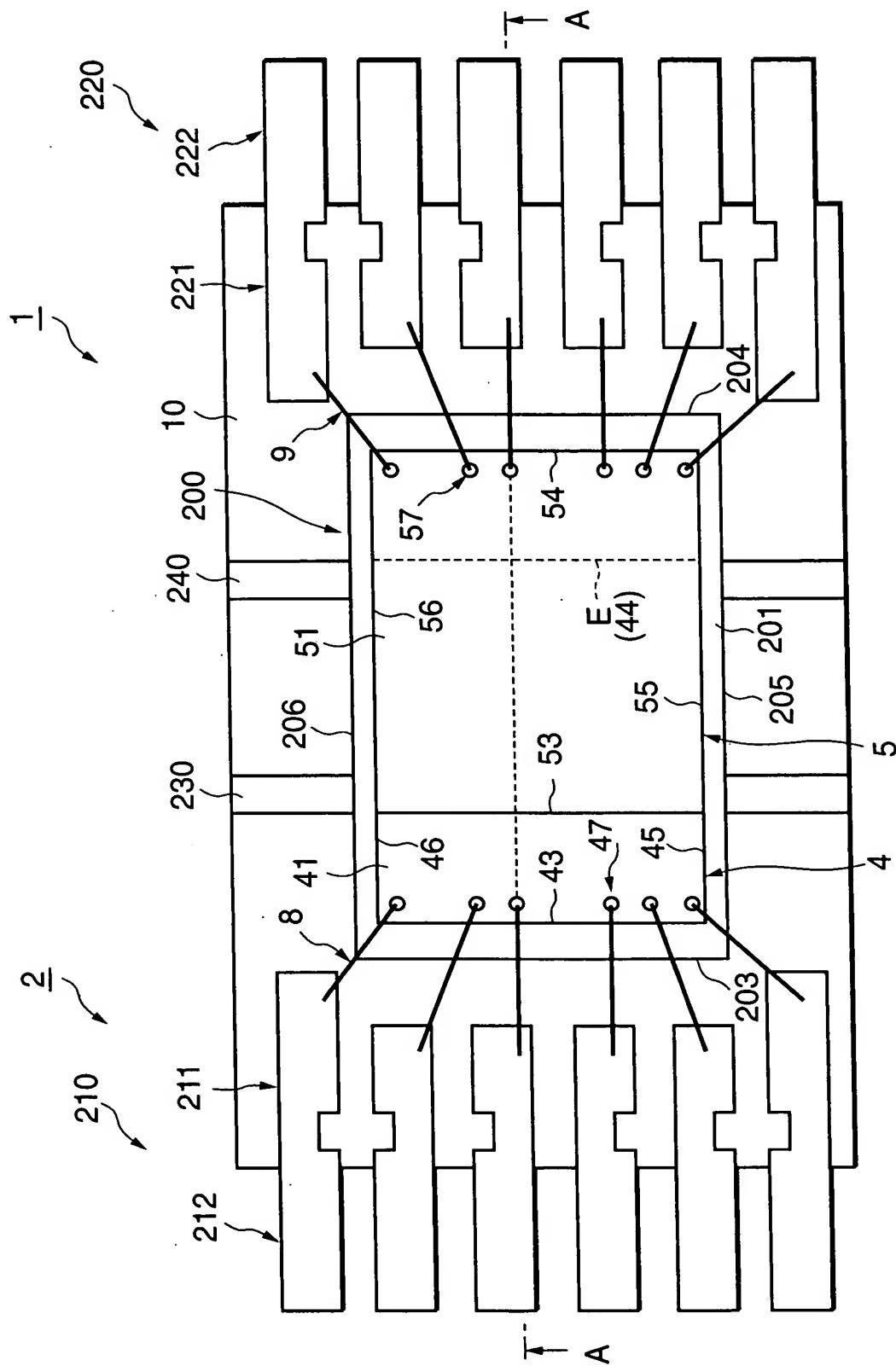
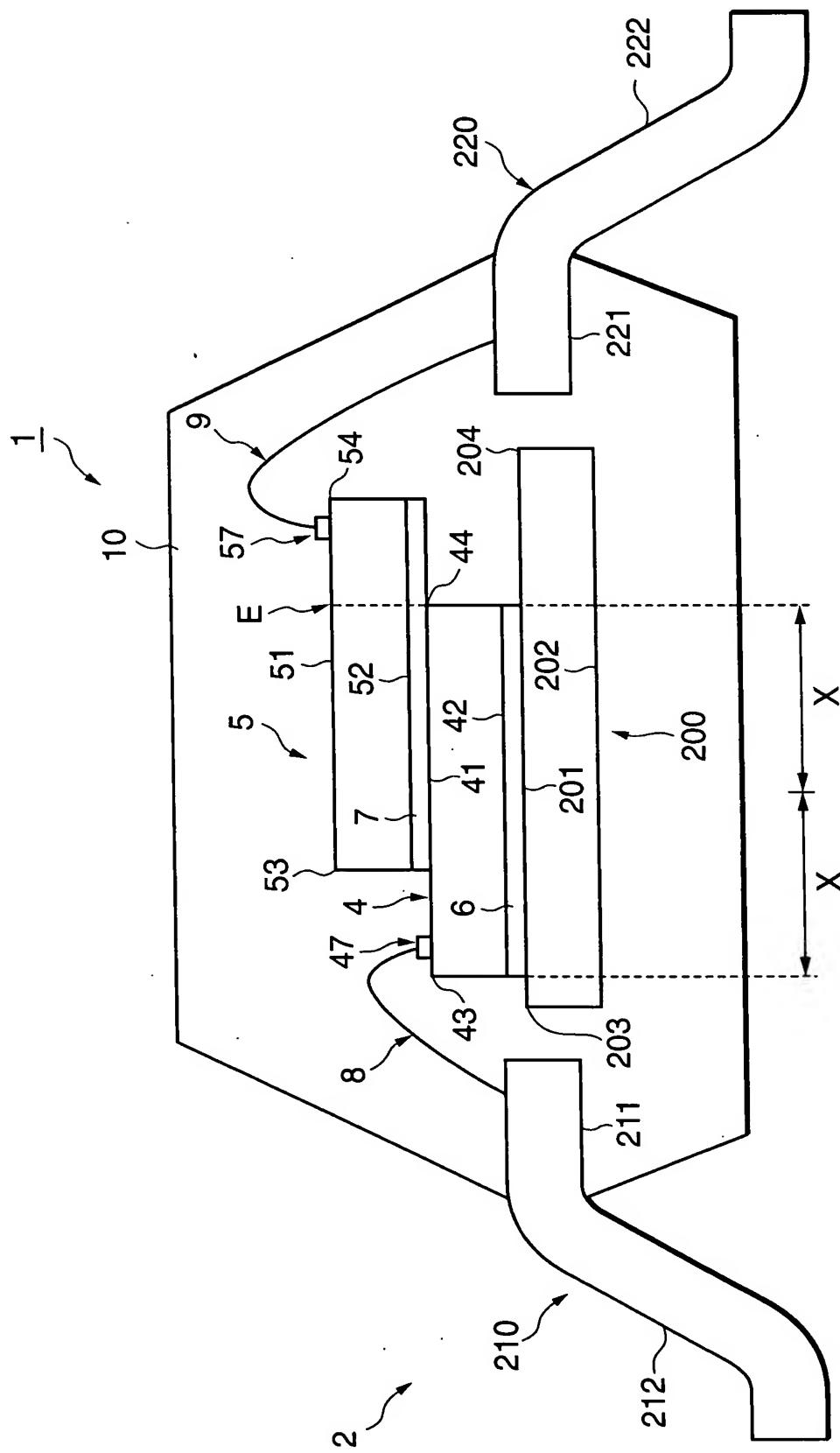


Fig.2



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Fig.3

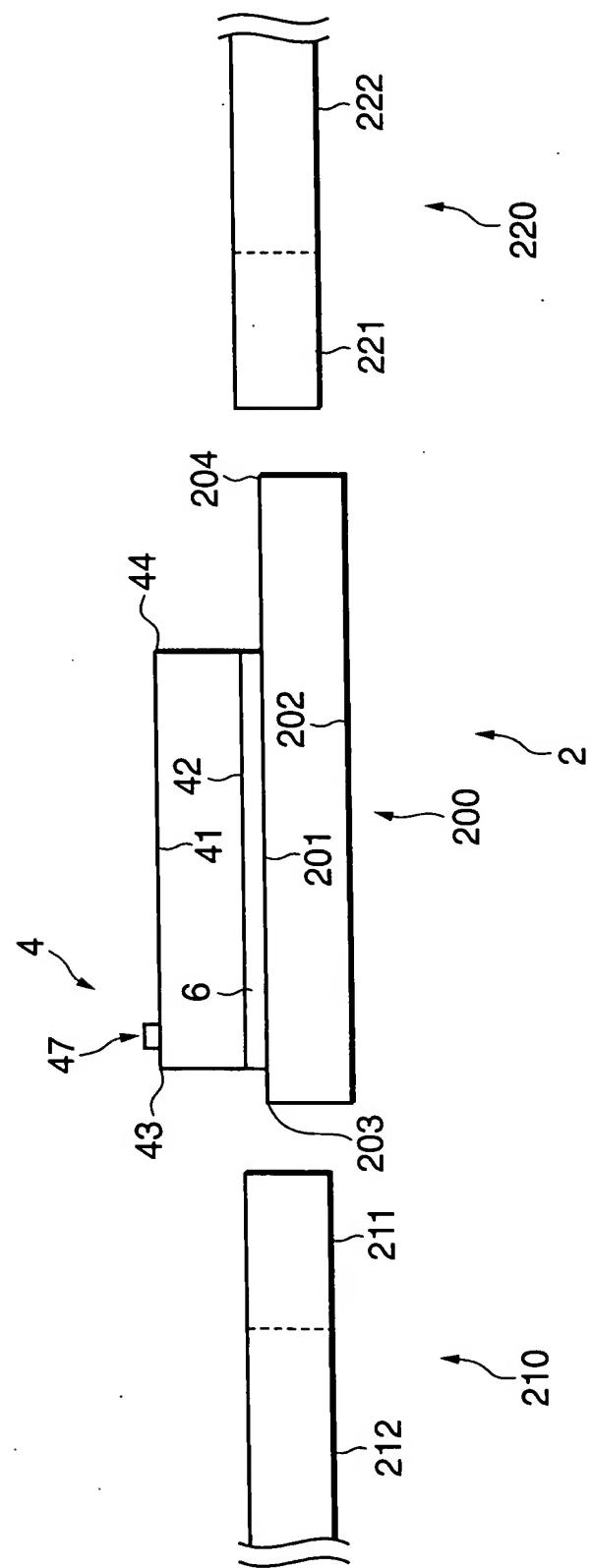
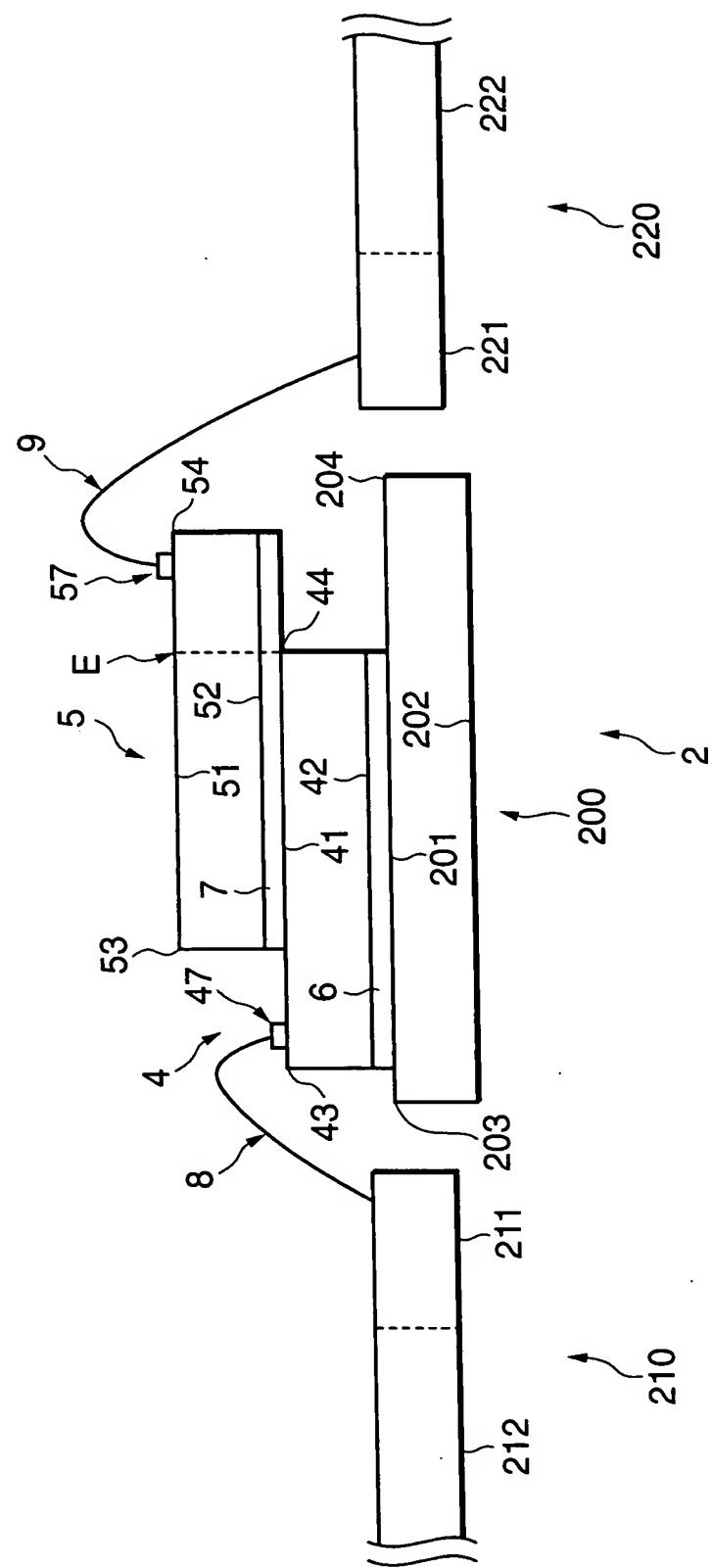


Fig. 4



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Fig.5

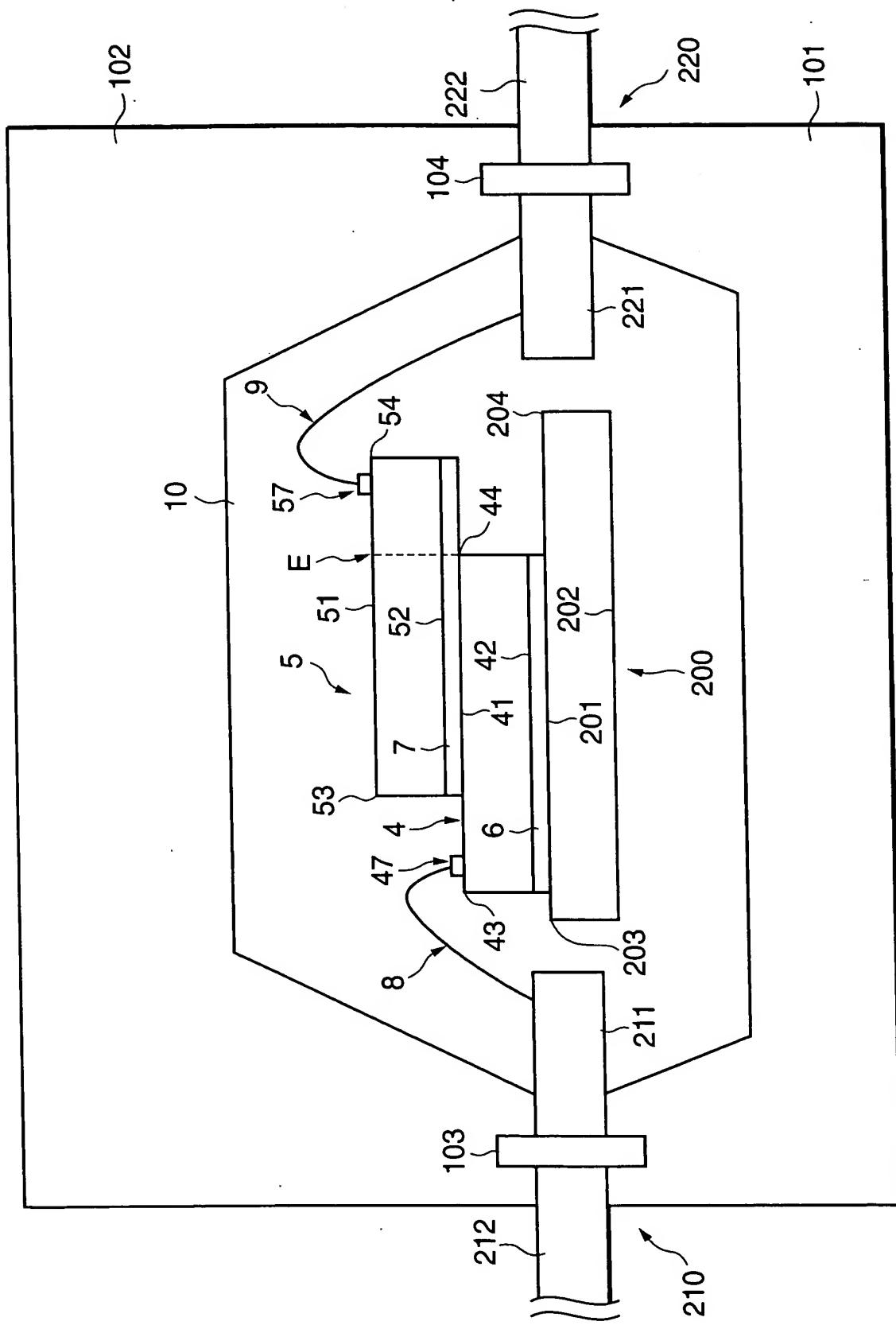
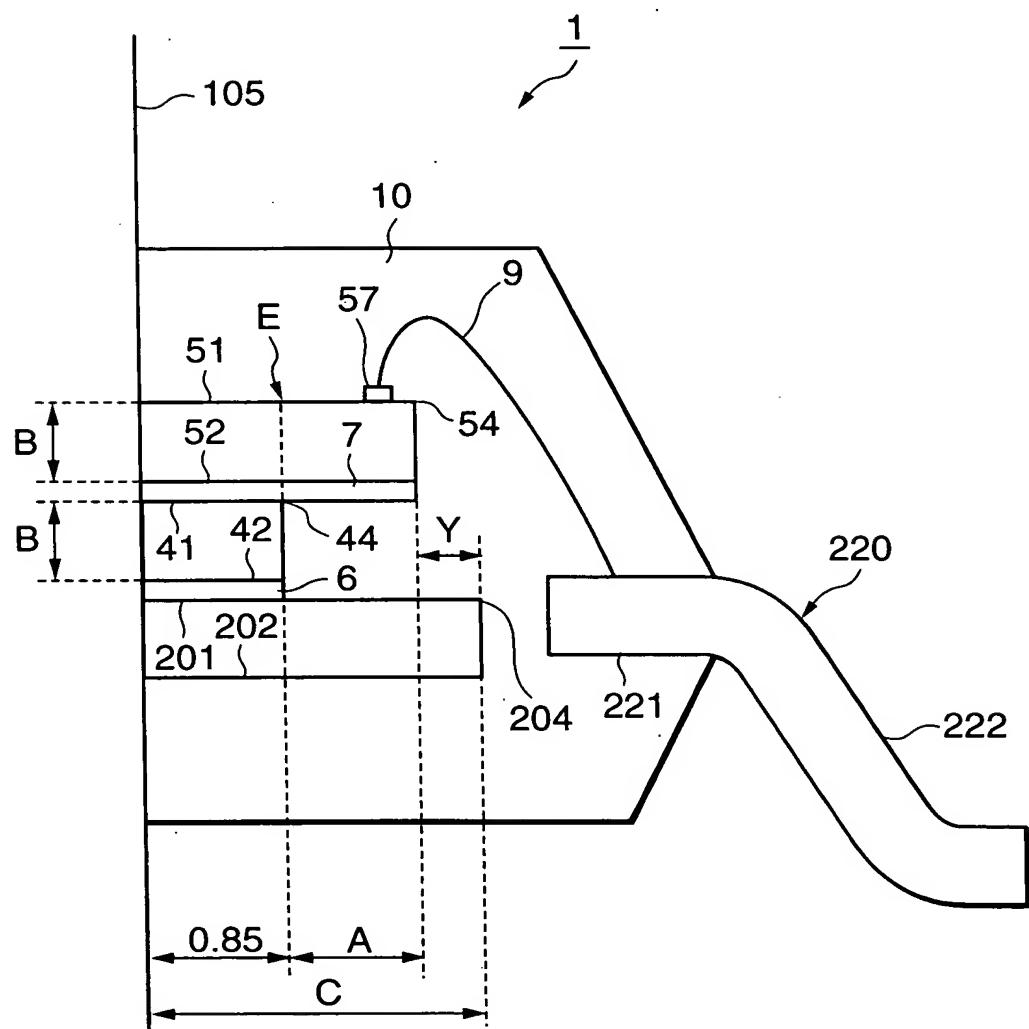


Fig.6



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Fig.7(a)

MATERIAL	ELASTIC MODULUS (kg/mm <sup>2</sup> )	POISSON'S RATIO
BASE MATERIAL OF SEMICONDUCTOR CHIPS	17335	0.07
LEAD FRAME	14800	0.3
RESIN ENCAPSULATING OR SEALING BODY	80	0.24
ADHESIVE	240	0.3

Fig.7(b)

## THE RATIO TO LENGTH OF SEMICONDUCTOR CHIPS

ITEM \ CONDITIONS	1	2	3
AMOUNT A OF DISPLACEMENT	0.1	0.2	0.3
THICKNESS B OF CHIP	0.02	0.04	0.06
HALF C OF LENGTH OF DIE PAD	0.7	1	1.3

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Fig.8

NUMBER OF EXPERIMENTS	MAXIMUM STRESS (ALL)			MAXIMUM STRESS (EDGE PORTION)	MEASURE OF STRESS : kg/mm <sup>2</sup>
	A	B	C		
1	1	1	1	9.1	2.6
2	1	2	2	6.9	2.9
3	1	3	3	3	1.8
4	2	1	2	9.2	1.5
5	2	2	3	7	3.1
6	2	3	1	4.6	4.4
7	3	1	3	9.2	1
8	3	2	1	6.4	5.3
9	3	3	2	4.6	3.9

Fig.9(a)

LEVEL-BY-LEVEL AVERAGE OF MAXIMUM STRESS (ALL) (kg/mm<sup>2</sup>)

	A1	A2	A3	B1	B2	B3	C1	C2	C3
6.3	6.9	6.7	9.2	6.8	4.1		6.7	6.9	6.4

Fig.9(b)

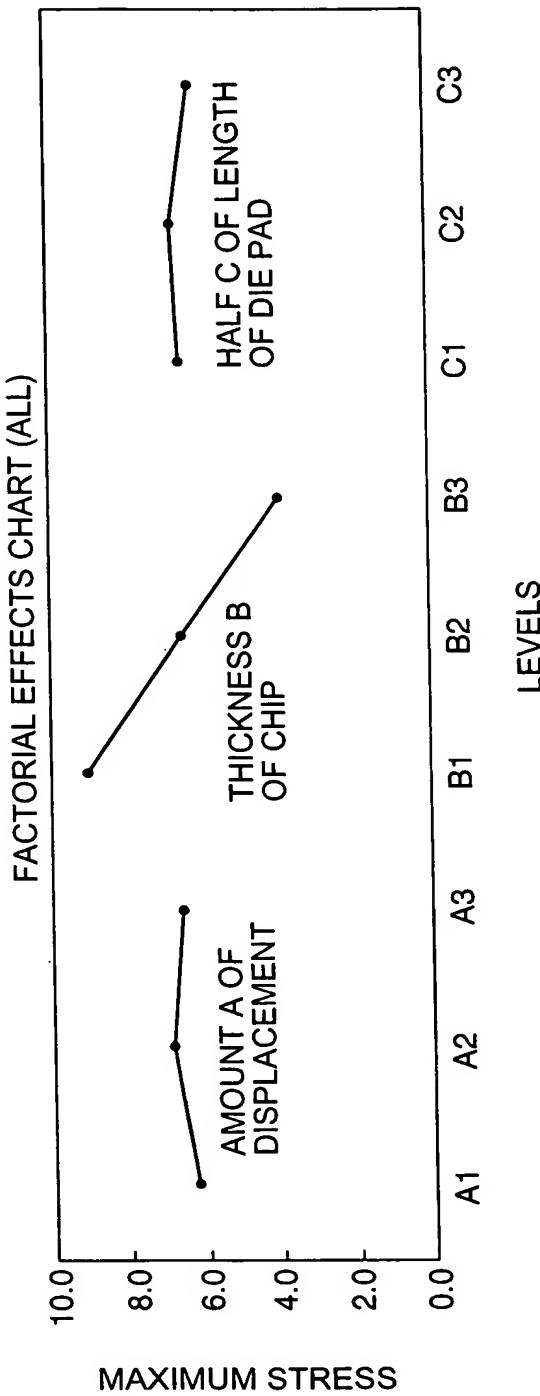


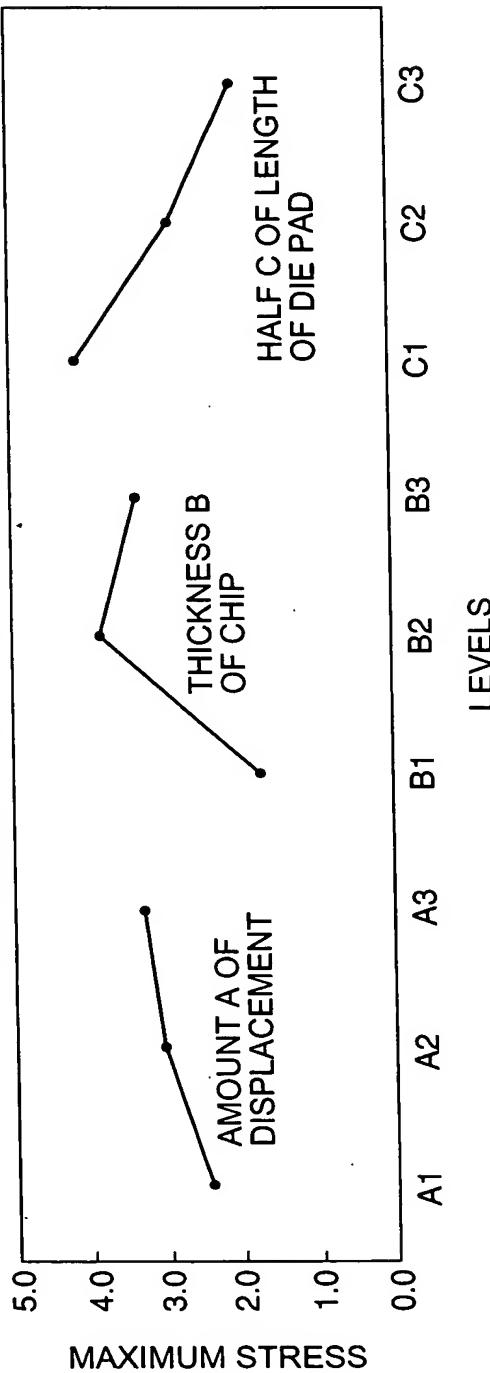
Fig. 10(a)

LEVEL-BY-LEVEL AVERAGE OF MAXIMUM STRESS (EDGE PORTION) (kg/mm<sup>2</sup>)

A1	A2	A3	B1	B2	B3	C1	C2	C3
2.4	3.0	3.4	1.7	3.8	3.4	4.1	2.8	2.0

Fig. 10(b)

FACTORIAL EFFECTS CHART (EDGE PORTION)



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Fig. 11

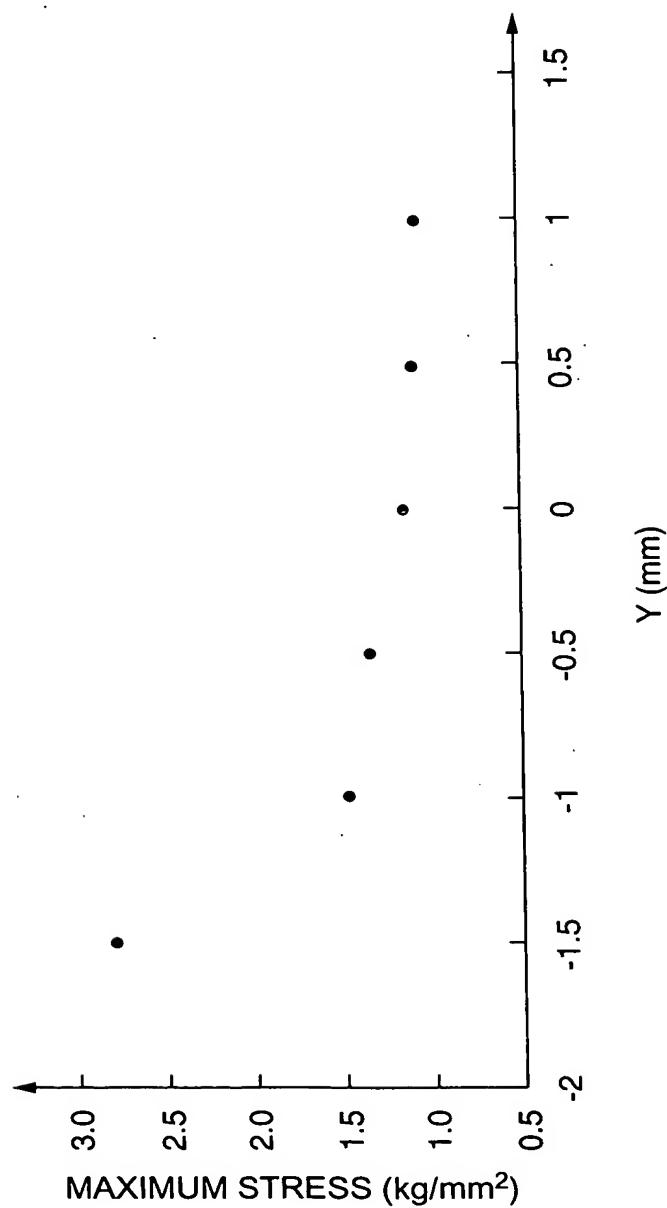


Fig.12(a)

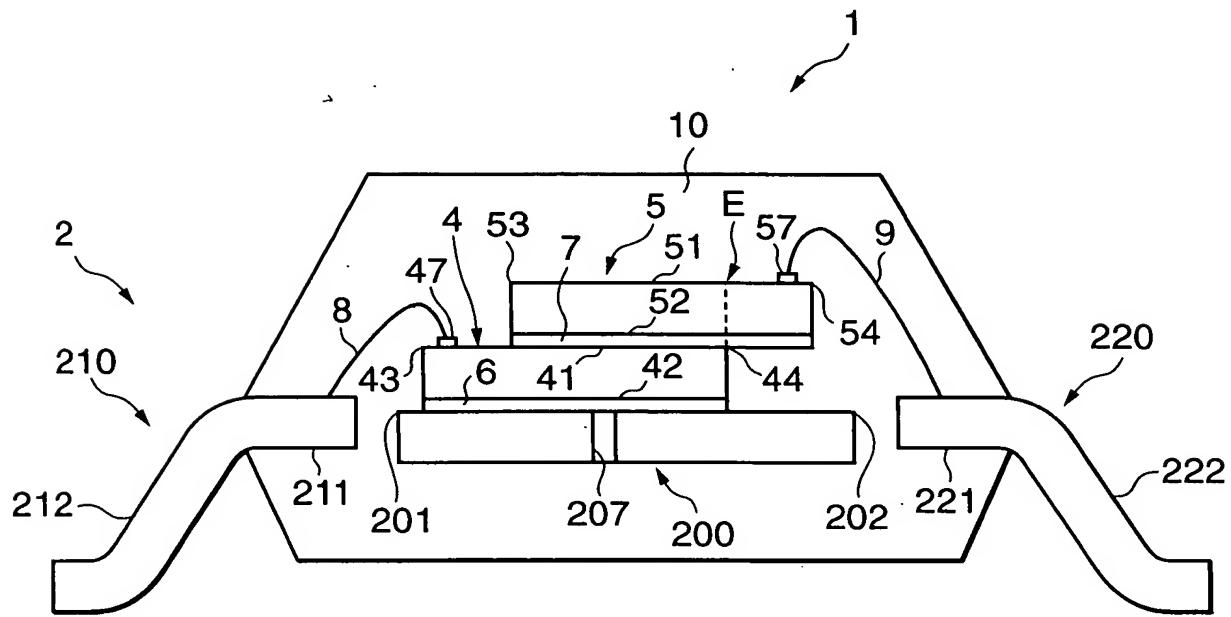
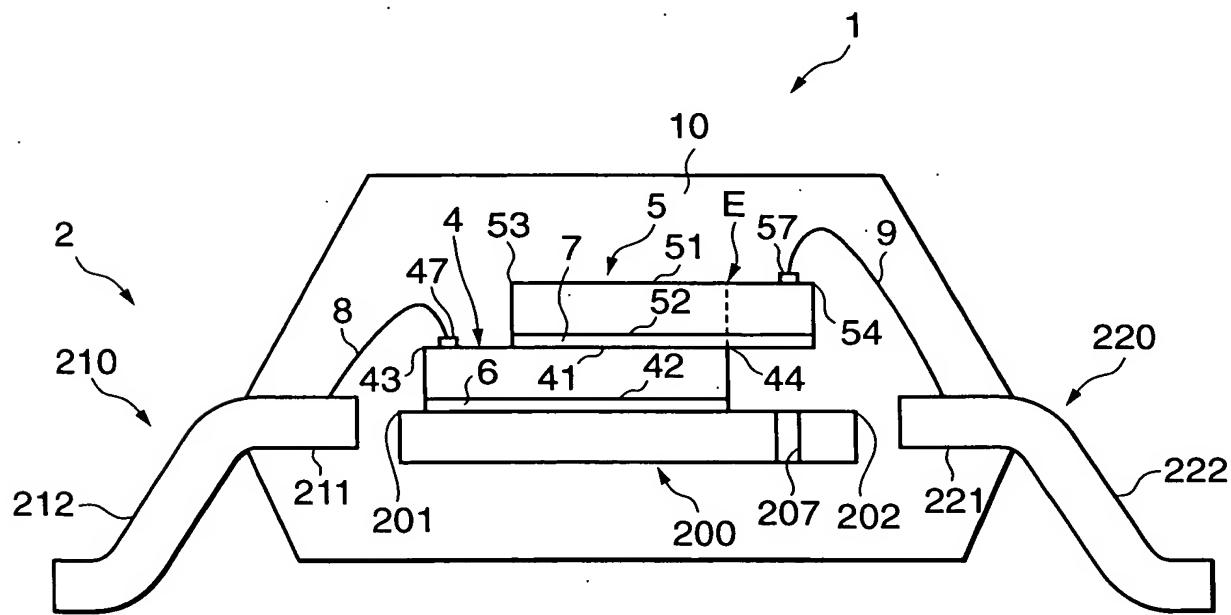


Fig.12(b)



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Fig.13

SHAPE OF DIE PAD SECTION	STRESS (kg/mm <sup>2</sup> )
SLITS	4.0
NO SLIT	0.1

Fig.14(a)

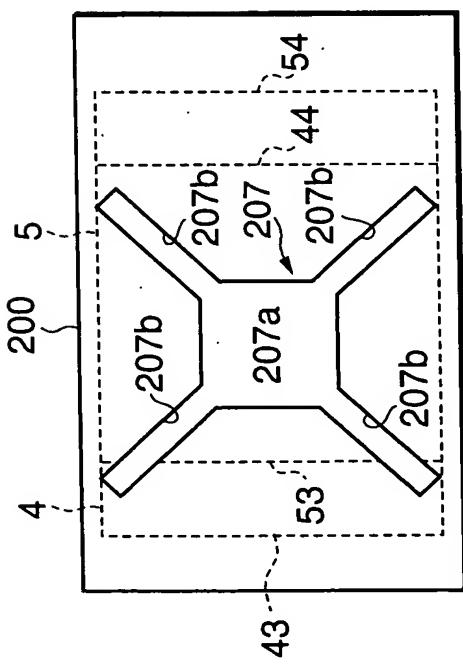


Fig.14(b)

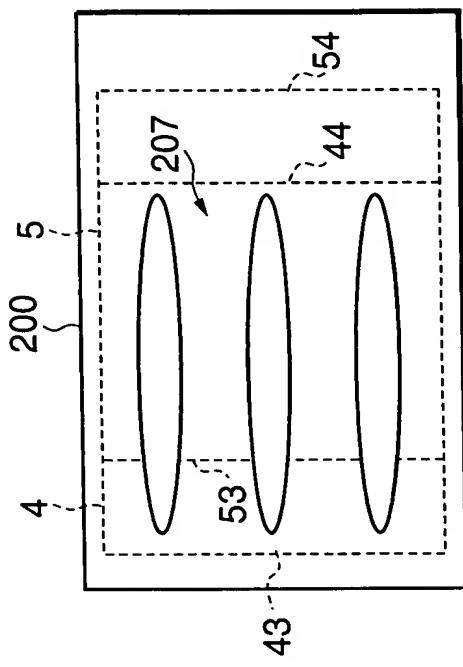


Fig.14(c)

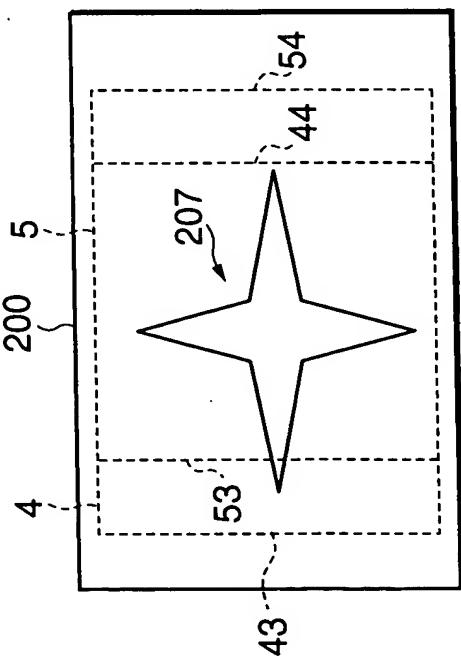


Fig.14(d)

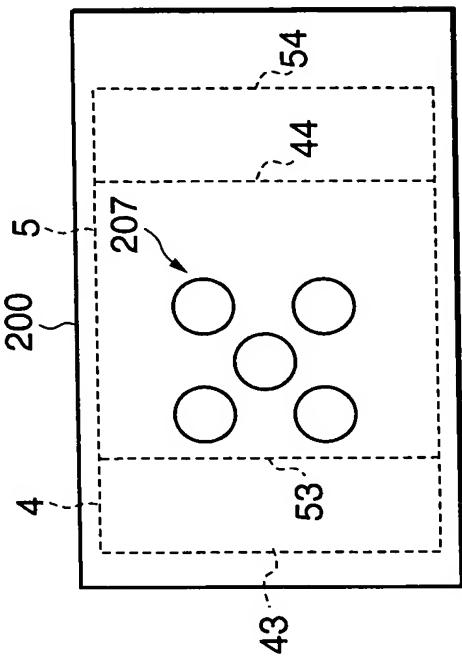


Fig. 15

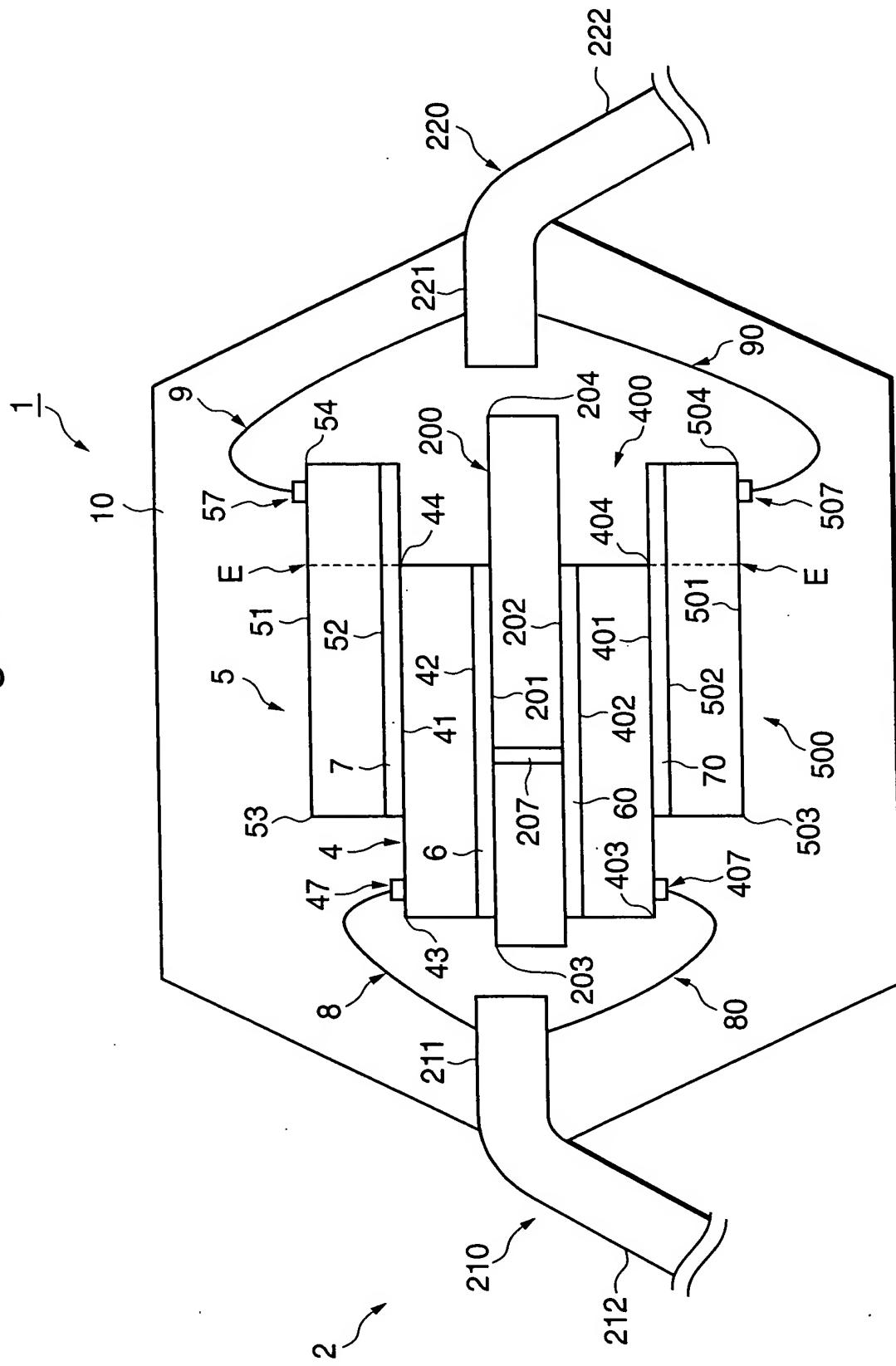


Fig.16

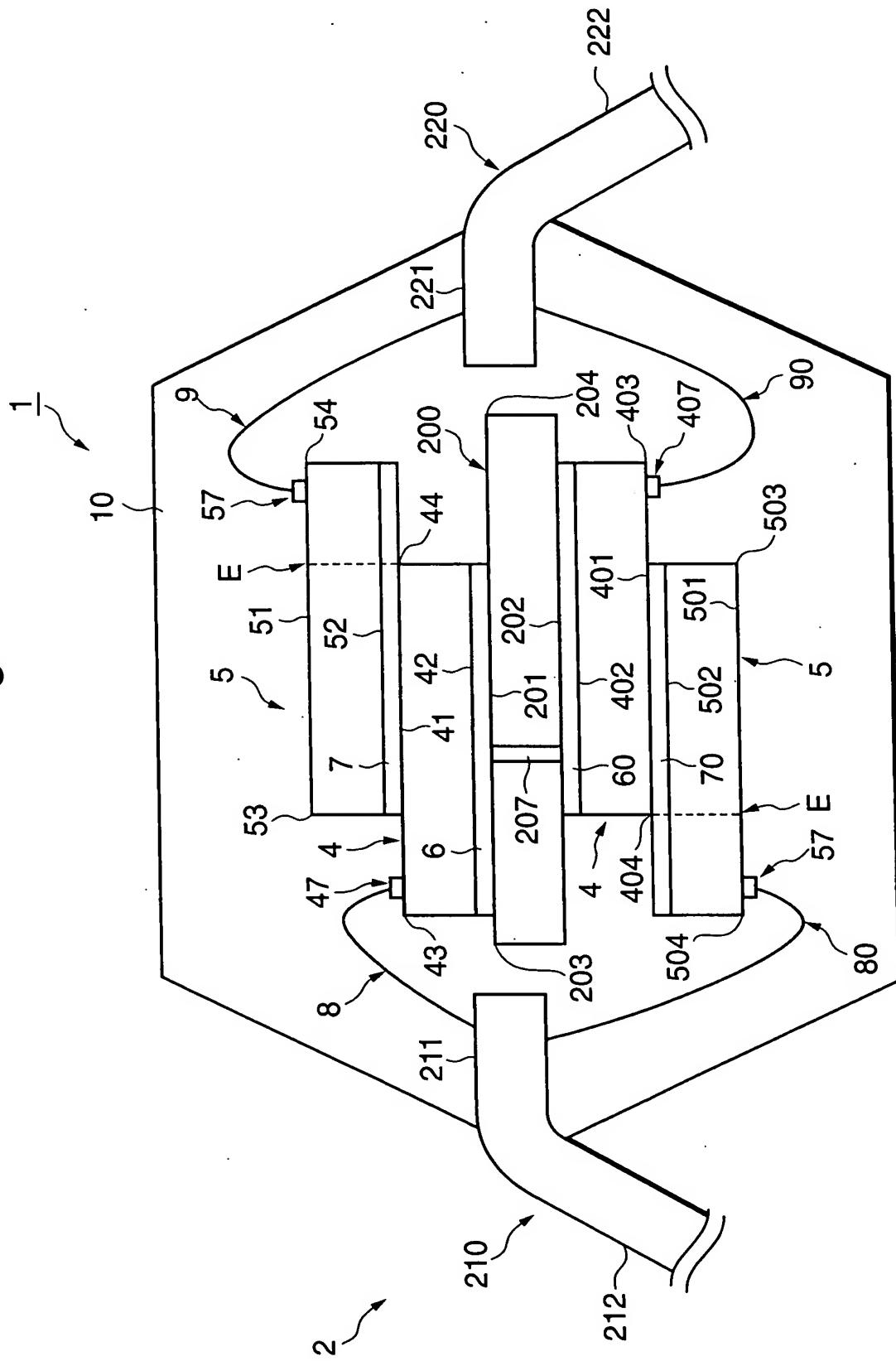


Fig.17

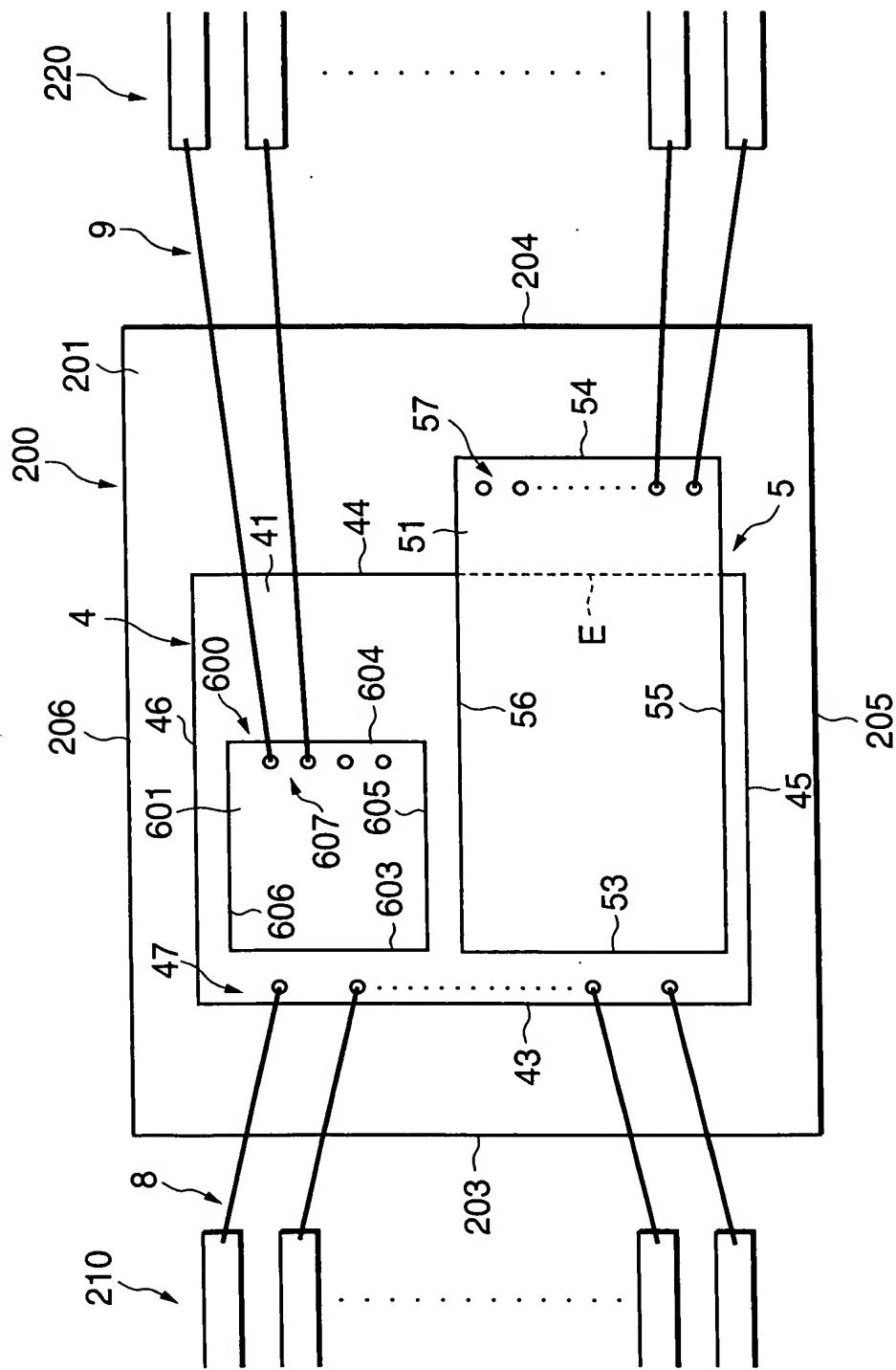


Fig. 18

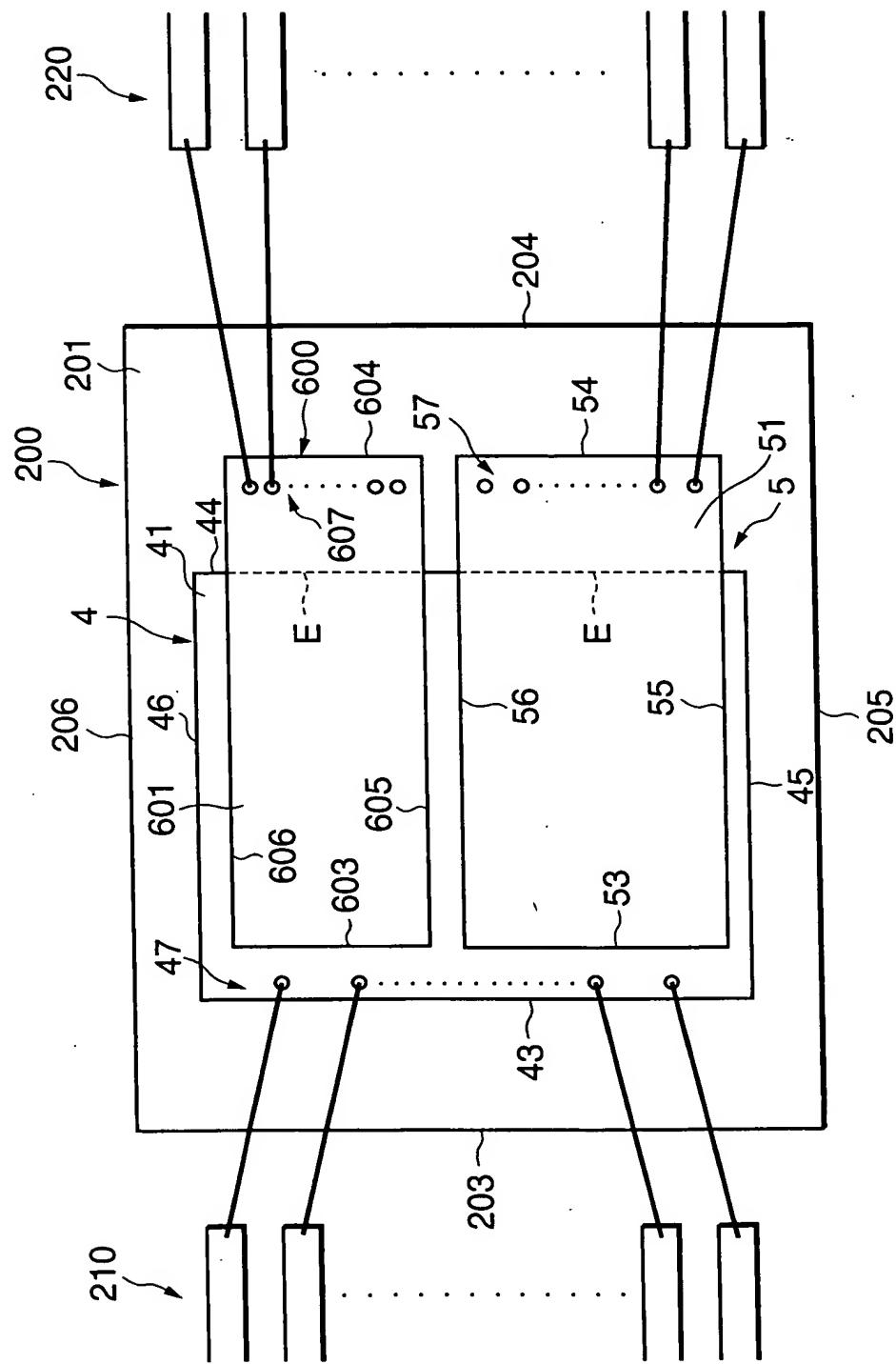
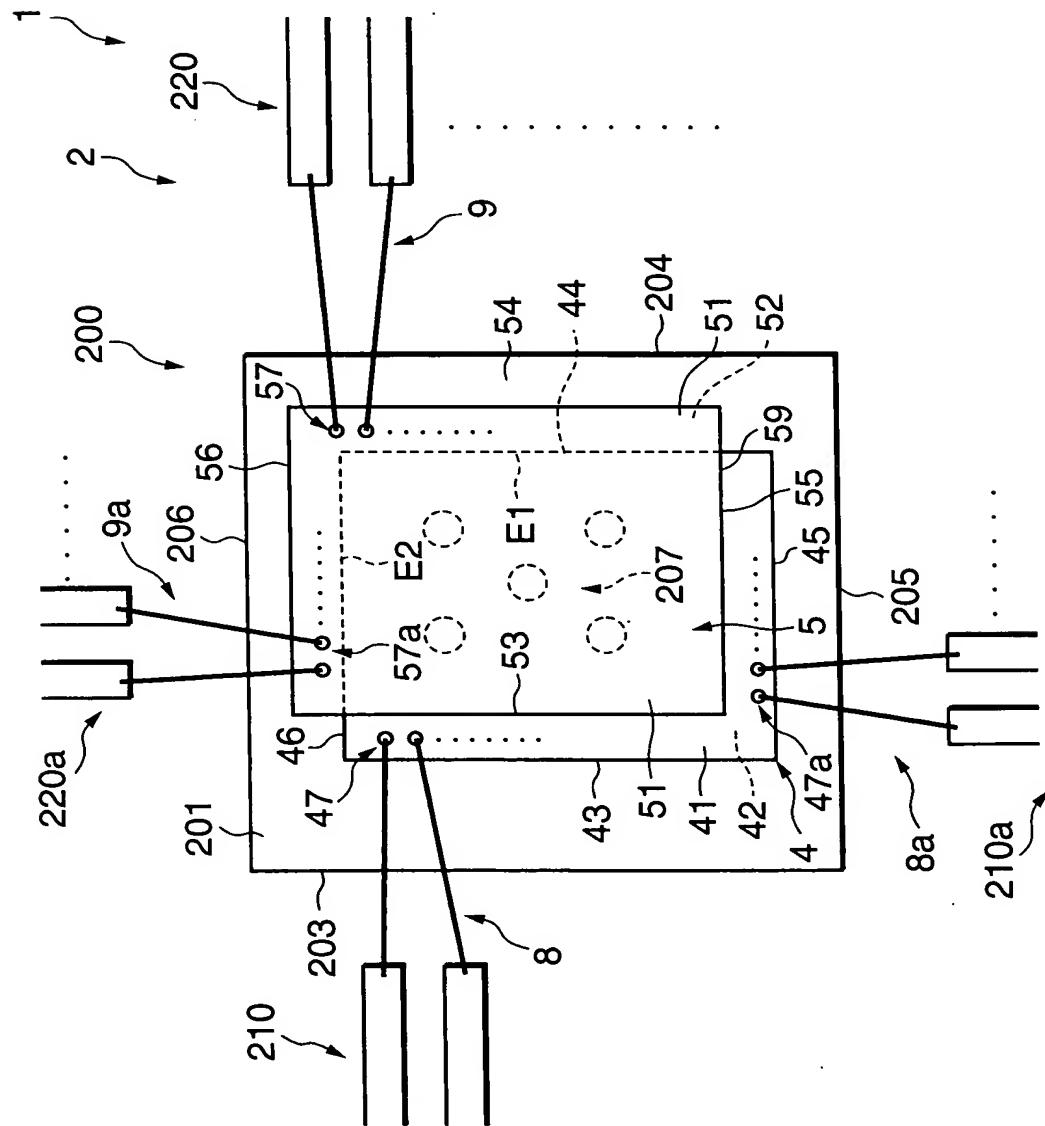


Fig.19



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Fig.20

